REMARKS

Claims 1-32 are pending in the application with claims 10, 22, 25 and 30-32 amended herein and claim 33 cancelled herein.

Claims 10-21 stand rejected as being anticipated by Joubert 1996 (O. Joubert, T.W. Weidman, A.M. Joshi, R.L. Kostelak (Micro Electronic Engineering 30, 1996, pages 275-278). Applicants request reconsideration.

Amended claim 10 sets forth a semiconductor processing method that includes, among other steps, depositing a layer of material comprising silicon and oxygen, as initially deposited over a substrate. Some portions of the layer are exposed to energy, altering physical properties in comparison to other unexposed portions. After the exposing, the exposed and unexposed portions are subjected to common conditions effective to remove either the exposed or unexposed portions faster than the other of the exposed and unexposed portions.

Pages 2-3 of the Office Action rely on Joubert 1996 as allegedly disclosing depositing PPMS having a chemical structure comprising carbon, silicon, and oxygen. However, as clearly described on page 276 of Joubert 1996, PPMS does not comprise oxygen, as initially deposited. As is well known to those skilled in the art, methylsilane has the chemical formula $(CH_3)SiH_3$ and does not comprise oxygen. Page 276 merely states methylsilane is polymerized and deposited onto a substrate in a plasma. Joubert 1996 does not in any way describe depositing oxygen along with the initially deposited PPMS. In addition, section 2 of page 275 describes in further detail an example of the processing disclosed in Joubert 1996 and clearly establishes that PPMS is deposited without

oxygen and that oxygen incorporation occurs as a separate step after deposition. Rather, figure 1 on page 276 clearly shows initially deposited PPMS as comprising only carbon, silicon, and hydrogen. Figure 1 further shows additional treatment of PPMS after initial deposition with UV exposure in air to form PPMSO, incorporating oxygen into the PPMS. Notably, the PPMSO shown in figure 1 does not disclose depositing a layer of material comprising silicon and oxygen, as initially deposited, over a substrate. Incorporation of oxygen into the as deposited material of figure 1 is clearly shown as a step subsequent to deposition to PPMS. Anticipation requires disclosure of each and every claim element. Accordingly, Joubert 1996 does not anticipate claim 10.

Claims 11-21 depend from claim 10 and are further not anticipated by Joubert 1996 at least for such reason as well as the additional limitations for such claims not disclosed. For example, claim 14 sets forth that the silicon-comprising material comprises $(CH_3)_ySi(OH)_{4-y}$ with y being greater than 0 and less than 4. Joubert 1996 does not in any way disclose an initially deposited material as set forth in claim 10. Further, Joubert 1996 does not even disclose that PPMSO has a composition within the scope of the compositional range as set forth in claim 14. The structure shown in figure 1 for PPMSO includes insufficient -OH groups in comparison to the range set forth in claim 14. Accordingly, Joubert 1996 further does not anticipate claim 14.

Also, for example, claim 15 sets forth that the silicon-comprising material comprises $Si(OH)_4$. Joubert 1996 does not disclose claim 15 nor does the Office

Action even allege disclosure of claim 15 in Joubert 1996. Accordingly, rejection of claim 15 as anticipated is improper.

Also, for example, claim 17 sets forth that the energy to which some portions are selectively exposed is in the form of an electron beam and claim 18 sets forth that the energy is in the form of plasma. Page 3 of the Office Action states that Joubert 1996 discloses plasma energy on page 275. However, Joubert 1996 merely describes a plasma etch process in which all of a patterned film is exposed to the plasma. Accordingly, Joubert 1996 does not disclose exposing some portions to plasma energy while leaving other portions unexposed, as set forth in claim 18 incorporating the subject matter of claim 10. Thus, Joubert 1996 does not anticipate claim 18. The Office Action does not even allege that Joubert 1996 discloses the electron beam of claim 17. Rejection of claim 17 as anticipated is thus improper.

Also, for example, claim 19 sets forth that the silicon-comprising material includes $(CH_3)_ySi(OH)_{4-y}$ with y being greater than 0 and less than 4. Claim 19 further sets forth that the common conditions effective to remove exposed or unexposed portions at different rates of removal includes subjecting the entire layer to hydrofluoric acid. As discussed above regarding claim 14, Joubert 1996 does not disclose the composition of claim 19. Joubert 1996 further does not provide even a mention of hydrofluoric acid. Accordingly, Joubert 1996 does not anticipate claim 19.

Further, for example, claims 20 and 21 set forth that the silicon-comprising material comprise $Si(OH)_4$ which is not disclosed by Joubert 1996 as discussed

above regarding claim 15. Claims 19 and 20 further set forth that the common conditions include using hydrofluoric acid. As discussed above regarding claim 19, Joubert 1996 does not disclose such a step. Claim 21 further sets forth that the energy is in the form of an electron beam. As discussed above regarding claim 17, Joubert 1996 does not disclose such energy. Accordingly, Joubert 1996 does not disclose the method of claim 20 or 21.

Given the complete failure of Joubert 1996 to disclose several features set forth in the various claims, claims 10-21 are not anticipated by Joubert 1996 and Applicants request allowance in the Office's next action.

Claims 25-28 and 33 stand rejected as being anticipated by Hayase. Applicants request reconsideration.

Amended claim 25 sets forth a semiconductor processing method that includes, among other steps, depositing a layer comprising $Si(OH)_4$, as initially deposited over a substrate. Some portions of the layer are exposed to energy and converted to SiO_2 while other portions are left unexposed. The exposed and unexposed portions of the layer are subjected to hydrofluoric acid to selectively remove $Si(OH)_4$ of the unexposed portions relative to the SiO_2 of the exposed portions. Pages 3-4 of Office Action allege that Hayase discloses forming a silanolic hydroxyl group layer on a substrate. However, Hayase does not disclose depositing a layer comprising $Si(OH)_4$, as deposited, as set forth in claim 25. Column 37, line 24-46 merely describe that an organosilane compound is formed on a substrate. Notably, disclosure of an organosilane layer does not constitute disclosure of a layer comprising $Si(OH)_4$. The organosilane layer of

Hayase does not even resemble the composition set forth in claim 25 for the as deposited layer. Rather, selective exposure to light to decompose the polysilane in the Hayase film is required after forming the film to create Si-OH groups. Accordingly, Hayase does not disclose depositing a layer comprising $Si(OH)_4$, as initially deposited, over a substrate. At least for such reason, Hayase does not anticipate claim 25.

Claims 26-28 depend from claim 25 are further not anticipated at least for such reason as well as the additional limitations not disclosed. For example, claim 27 sets forth that the energy is in the form of ultraviolet light and is passed into the layer of $Si(OH)_4$ through openings in a patterned mask. Column 37, lines 24-31 of Hayase clearly describe that the only energy that is passed through a patterned mask is passed into a layer of SiH_4, rather than into a layer of $Si(OH)_4$ as set forth in claim 27. Hayase does not provide any mention of selective exposure or patterning of a layer of $Si(OH)_4$ as claimed. Accordingly, Hayase further fails to anticipate claim 27.

Given the failings of Hayase described above, claims 25-28 are not anticipated by Hayase and Applicants request allowance in the Office's next action.

Claims 1-9 and 30-32 stand rejected as being unpatentable over Joubert 1996. Applicants request reconsideration.

Claim 1 sets forth a semiconductor processing method that includes, among other steps, forming a layer of material over a substrate, exposing some portions of the layer to energy and altering physical properties while leaving other

portions unexposed, subjecting the exposed and unexposed portions to common conditions effective to remove the exposed and unexposed portions at different rates of removal, and after the removal of the exposed or unexposed portions, cutting the wafer into separated die. Pages 5-6 of the Office Action allege that Joubert 1996 disclosed the method of claim 1 but fails to "teach cutting the wafer into separated die." The Office Action further alleges that it would be obvious to form dice in order to form the individual packing after a step of forming a device on the wafer. However, the Office Action apparently fails to recognize that claim 1 sets forth cutting the wafer into separated die while one of the exposed or unexposed portions remains over the substrate. As set forth on pages 2-3 of the present specification, photoresist is normally entirely removed from a wafer prior to a die-cutting process. It is an unexpected advantage of the method set forth in claim 1 that the layer of material formed over the substrate can be selectively patterned and the wafer cut into separated die while allowing a portion of the material to remain over the substrate. Since no suggestion or motivation exists in Joubert 1996 or any other cited reference to cut a wafer while a portion of the patterned layer remains over a substrate, accordingly such step is not obvious.

Obviousness requires that all claimed limitations must be taught or suggested by the prior art. The mere fact that prior art can be modified does not make the modification obvious "unless the prior art suggested the desirability of the modification." In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The problem confronted by the inventor must be considered in

determining whether it would have been obvious to modify a reference in order to solve the problem. Diversitech Corp. v. Century Steps Inc., 7 USPQ2d 1315, 1318 (Fed. Cir. 1988). If the references do not address or even recognize a problem they cannot begin to teach or suggest a solution to it. Joubert 1996 does not in any way address the problem solved by the Applicant's invention and, accordingly, cannot suggest a solution to such problem. One of ordinary skill in the art viewing Joubert 1996 would consider the method set forth in claim 1 to possess unexpected advantages over the cited art. Accordingly, claim 1 is patentable over Joubert 1996.

Claims 2-9 and 30-32 depend from claim 1 and are further patentable over the art at least for such reason as well as the additional limitations of such claims not disclosed or suggested. For example, amended claim 30 sets forth that the forming a layer comprises depositing a layer of material comprising oxygen as initially deposited. As can be seen from the discussion above regarding claim 10, Joubert 1996 does not disclose or suggest depositing such a layer of material. Also, amended claim 31 sets forth that the forming a layer comprises depositing a layer of material comprising $(CH_3)_ySi(OH)_{4-y}$, as initially deposited, with y being greater than 0 and less than 4. Further claim 32 sets forth that the forming a layer comprises depositing a layer of material comprising $Si(OH)_4$, as initially deposited. As can further be seen from the discussion above regarding the various claims, Joubert 1996 does not disclose or suggest the steps set forth in claims 31 and 32.

At least for the reasons described above, claims 1-9 and 30-32 are patentable over Joubert 1996 and Applicants request allowance in the Office's next action.

Claims 6, 8, 15, 17, 19-21, and 32 stand rejected as being unpatentable over Joubert 1996 in view of Hayase. Applicants request reconsideration.

Claims 6, 8, and 32 depend from claim 1, the subject matter of which is described above. As indicated above, such claims are patentable over Joubert given the failings of Joubert to disclose or suggest every limitation set forth in claim 1. Claim 32 is further patentable over Joubert 1996 at least for the additional reasons described above. Review of Hayase reveals that such reference further does not provide even a mention of cutting a wafer into separated die while leaving one of an exposed or unexposed portion of the layer over the substrate. Accordingly, both references fail to disclose or suggest every limitation of claim 1. Further, both references fail to recognize the unexpected advantages of such undisclosed step in the method of claim 1. Claims 6, 8, and 32 are thus patentable over the cited combination at least for such reason.

Claims 15, 17, and 19-21 depend from claim 10, the subject matter of which is described above. As also described above, Joubert 1996 fails to disclose each and every element set forth in claim 10. Applicants further assert that no suggestion or motivation whatever exists in Joubert 1996 to deposit a layer of material comprising silicon and oxygen, as initially deposited, over a substrate as set forth in claim 10. Hayase further does not provide any disclosure or suggestion of such a method step. Since both references are

deficient in disclosure or suggestion of claim 10 in the same respects, it is not possible that a combination of such references can somehow suggest every element of the claimed method. Accordingly, claims 15, 17, and 19-21 are patentable over the cited combination at least for such reason. The cited references further fail to disclose or suggest the additional limitations set forth in claims 15, 17, and 19-21 as discussed above in particularity with reference to such claims. Accordingly, claims 15, 17, and 19-21 are patentable over the cited combination and Applicants request allowance in the Office's next action.

Claims 22-44 stand rejected as being unpatentable over Joubert '330 (EP0942330 A1) in view of Hayase. Applicants request reconsideration. Amended claim 22 sets forth a semiconductor processing method that includes, among other steps, depositing a layer comprising $(CH_3)_ySi(OH)_{4-y}$, as initially deposited, with y being greater than 0 and less than 4, over a substrate. The method includes exposing some portions of the layer to ultraviolet light and converting the exposed to $(CH_3)_xSiO_{2-x}$, with x being greater than 0 and less than 2. The unexposed portions are selectively removed with hydrofluoric acid relative to the exposed portions. Page 10 of the Office Action alleges that Joubert '330 discloses all subject matter of claim 22 except for subjecting the layer of organosilanol to hydrofluoric acid. Review of Joubert '330, in particular, column 2, line 6-17 and figure 1A and its associated text reveal that such reference does not provide any more disclosure of an as deposited material comprising silicon and oxygen than Joubert 1996 discussed above. That is, Joubert '330 merely describes forming a PPMS film followed by incorporation of oxygen into

the deposited film only after deposition is complete. Accordingly, Joubert '330 does not describe a layer of the composition set forth in claim 22, as initially deposited. Review of Hayase further reveals that such reference fails to disclose or suggest the deposition step set forth in claim 22 (see, for example, the discussion above regarding claim 25). Since both Joubert '330 and Hayase fail to disclose the deposition step of claim 22, it is inconceivable that a combination of such references can somehow disclose or suggest every claim limitation. Claim 22 is thus patentable over the cited combination.

Claims 23 and 24 depend from claim 22 and are thus further patentable over the cited combination at least for such reason as well as the limitations of such claims not disclosed or suggested. For example, claim 23 specifies that ultraviolet light is passed into the layer of $(CH_3)_ySi(OH)_{4-y}$ through openings in a patterned mask. The only patterned exposure described in Joubert '330 or Hayase does not pass ultraviolet light through openings in a patterned mask and to a layer having the claimed composition. Rather, patterned exposure only occurs onto silane-comprising material and not silanol-comprising material. Claim 24 further sets forth cutting the wafer into separated die while the $(CH_3)_xSiO_{2-x}$ of the exposed portions remains over the substrate. The deficiencies of the cited references regarding such a method step is discussed above. Review of Joubert '330 and Hayase reveals such reference do not provide any disclosure or suggestion of the unexpected advantages provided by the method of claim 24.

At least for the reasons set forth above, claims 22-24 are patentable over Joubert '330 in view of Hayase and Applicants request allowance in the Office's next action.

Claim 29 stands rejected as being unpatentable over Hayase. Applicants request reconsideration. Claim 29 depends from claim 25 set forth above as patentable over the cited references. Hayase, as discussed above, does not disclose or suggest the deposition step as set forth in claim 25. Page 11 of the Office Action admits that Hayase fails to teach cutting the wafer into separated die. As discussed above regarding claim 24, Hayase further fails to disclose or suggest the unexpected advantages of the method set forth in claim 29 involving wafer cutting while SiO_2 remains over the substrate, as set forth in claim 29. Given the advantages of the claimed method not otherwise known in the art, claim 29 is patentable over Hayase.

Claims 1-32 are allowable at least for the reasons discussed above. Applicants therefore request formal allowance of pending claims 1-32 in the next Office Action.

Respectfully submitted,

Dated: 04 Apr 2001 By: _____
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Application Serial No. 09/234,233
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Attorney's Docket No. MI22-1035
Title: Semiconductor Processing Method

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING RESPONSE TO JANUARY 4, 2001 OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

10. (Twice amended) A semiconductor processing method, comprising:

depositing a layer of material comprising silicon and oxygen, as initially deposited, over a substrate;

exposing some portions of the layer to energy while leaving other portions unexposed, the exposing altering physical properties of the exposed portions relative to the unexposed portions; and

after the exposing, subjecting the exposed and unexposed portions of the layer to common conditions, the common conditions being effective to remove the silicon-comprising material and comprising a rate of removal that is influenced by the altered physical properties of the layer, the common conditions removing either the exposed or unexposed portions faster than the other of the exposed and unexposed portions.

22. (Once amended) A semiconductor processing method, comprising:

~~forming~~ depositing a layer ~~of~~ comprising $(CH_3)_ySi(OH)_{4-y}$, as initially deposited, with y being greater than 0 and less than 4, over a substrate;

exposing some portions of the layer to ultraviolet light while leaving other portions unexposed, the exposing converting the exposed portions to $(CH3)_xSiO_{2-x}$, with x being greater than 0 and less than 2; and

after the exposing, subjecting the exposed and unexposed portions of the layer to hydrofluoric acid to selectively remove the $(CH_3)_ySi(OH)_{4-y}$ of the unexposed portions relative to the $(CH_3)_xSiO_{2-x}$ of the exposed portions.

25. (Once amended) A semiconductor processing method, comprising:

~~forming~~ depositing a layer ~~of~~ comprising $Si(OH)_4$, as initially deposited, over a substrate;

exposing some portions of the layer to energy while leaving other portions unexposed, the exposing converting the exposed portions to SiO_2; and

after the exposing, subjecting the exposed and unexposed portions of the layer to hydrofluoric acid to selectively remove the $Si(OH)_4$ of the unexposed portions relative to the SiO_2 of the exposed portions.

30. (Once amended) The method of claim 1 wherein the forming a layer comprises depositing a layer of material comprising oxygen, as initially deposited.

31. (Once amended) The method of claim 1 wherein the forming a layer comprises depositing a layer of material comprising $(CH_3)_ySi(OH)_{4-y}$, as initially deposited, with y being greater than 0 and less than 4.

32. (Once amended) The method of claim 1 wherein the forming a layer comprises depositing a layer of material comprising $Si(OH)_4$, as initially deposited.

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